

TRAINING DEVICE ONBOARD INSTRUCTION STATION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to computer-aided training devices of the type commonly referred to as simulators and, more particularly, to the type of training devices which include an onboard instructor's console. Training devices of this type include simulators for vehicles such as transport aircraft, ships and large land vehicles and simulators for fixed station facilities such as power generators and chemical processes.

2. Description of the Prior Art

Training devices or simulators present scenes to a trainee to allow the trainee to practice some task, such as flying an airplane. In a flight simulator, for example, a three-dimensional model of the desired "gaming area" is prepared and stored on magnetic disk or similar bulk storage media. The visual simulator combines an image generator with an electro-optical display system such as a cathode ray tube (CRT) or similar display. The image generator reads in blocks of three-dimensional data from the disk and transforms this data into two-dimensional scene descriptions. The two-dimensional data are converted to analog video that is presented to the trainee via the display. The generated imagery is meant to be representative of the true scenes that the trainee would see if the trainee were actually performing the task being simulated. The generation of the display images is said to be in "real time" which is normally taken to mean 30 frames per second, as in the U.S. television standard. Computer image generating (CIG) systems are described in detail in the book entitled *Computer Image Generation* edited by Bruce J. Schacter and published by Wiley-Interscience (1983).

There are basically two types of simulators used for training purposes; those having an instructor's console on the simulator floor and those where the instructor's console is onboard. An example of the former type is a simulator for high performance aircraft, usually of the single-place variety. The present invention is specifically directed to the latter type of simulator where an instructor or senior crew member is on board the simulator with the trainees as part of the training mission. This would include any crew served vehicles but could include other training environments such as power plants, refining plants and the like.

The prior parallel configuration that supported instructor station facilities contained CRT displays with adjacent switch panels as part of the instructor's console. This type of display necessitated locating the instructor's console away from the trainees' positions. The arrangement was such that the instructor would have to sit at the instructor's console to control the training environment and then move to a position behind the trainees to observe the trainees' actions. In this latter position, the instructor could also observe the visual scene presented to the trainees, but when sitting at the instructor's console, the visual scene, including any instrumentation, was not readily observed by the instructor. Therefore, it was necessary to replicate much of the training environment at the instructor's console.

An example of the prior onboard instructor station is illustrated in FIG. 1. This figure is a plan view of the interior of a simulated aircraft cockpit and supporting

instructor station structure 10 for an aircraft simulator. Entry to the simulator platform is by means of a door 11. This platform is provided with CIG displays generally indicated at 12 which present a visual scene to the trainees through the cockpit windshield 13. There are two trainee positions; one for the pilot at 14 and the other for the co-pilot at 16. Along the axis of the cockpit are a pair of tracks 17 and 18 on which are mounted an instructor's seat 20 and an observer's seat 22. The observer's seat is shown at the back of the cockpit in its stowed position. The instructor's seat is shown facing an instructor's console 23 which includes two CRT displays 24 and 25 and a work surface 26. In addition to the instructor's console, there is schematically indicated an onboard I/O (input/output) rack 27 which provides the connections to simulator computer system (not shown) on the simulator floor.

In use, a training session begins by the instructor entering commands at the instructor's console 23 to invoke a desired training environment. Once the inputs have been made at the instructor's console, the instructor can swivel seat 20 counter clockwise by 90° and move it forward on the tracks 17 and 18 so that the instructor is just behind the right shoulder of the co-pilot and the left shoulder of the pilot. In this position, the instructor can observe the actions of the pilot and co-pilot over their shoulders and also observe the visual environment, including both the imagery produced by the CIG displays 12 and the instrumentation at both the pilot's and co-pilot's positions. However, when the instructor needs to adjust or change the training environment, it is necessary to move the seat 20 back on tracks 17 and 18 and to swivel it clockwise 90° to again have access to the instructor's console 23. In so doing, the instructor cannot easily observe the visual environment presented to the trainees, the cockpit instrumentation or the trainees' actions. This presents a problem in the continuity of the training session.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a training device or simulator with a full time over-the-shoulder instructional position from which no changes in the forward-facing posture of the instructor are necessary to control and monitor the training mission.

It is another object of the invention to provide an instructor's position in an onboard instructor station which makes possible a unidirectional scan pattern by the instructor to observe trainees' actions, the simulated environment and the human/computer interface for the instructor.

It is a further object of the invention to provide an efficient packaging of the instructor's controls and display for an onboard instructor station of a training device allowing a single instructor position and eliminating displays and work surface required for the prior instructor console.

According to the invention, the onboard instructor station for a training device provides a human/computer interface that is designed to support an optimum instructor's scan pattern of the training scenario. All displays and switches required to control and monitor the mission are resident at the instructor's work surface directly in front of, and tangent to the instructor's seated position. This design allows for a dedicated over-the-shoulder observation position. Therefore, the in-